MBC-SE 1000/2500/4000
GasMultiBloc®
Combined servo pressure regulator and safety shut-off valves
Installation Instructions

USA CDN

DUNGS®
Combustion Controls

Table of Contents

Approvals

UL Listed / Recognized Component:
File No. MH16727 to UL 429

CSA Certified File No.157406 to
ANSI Z21.21 / CSA 6.5 with C/I marking
ANSI Z21.18 / CSA 6.3

FM APPROVED

FM 7400 Approved

Commonwealth of Massachusetts Approved Product Approval code G1-1107-35

DESIGN PLUS

Attention

The installation and maintenance of this product must be done under the supervision of an experienced and trained specialist. Never perform work if gas pressure or power is applied, or in the presence of an open flame.

Check the ratings in the specifications to make sure that they are suitable for your application.

Please read the instruction before installing or operating. Keep the instruction in a safe place. You find the instruction also at www.dungs.com If these instructions are not heeded, the result may be personal injury or damage to property.

On completion of work on the safety valve, perform a leakage and function test.

Any adjustment and application-specific adjustment values must be made in accordance with the appliance-/boiler manufacturers instructions.

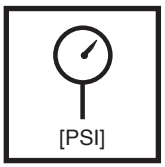
This product is intended for installations covered by, but not limited to, the following fuel gas codes and standards: NFPA 54, IFGC (International Fuel Gas Code), or CSA B149.1 (for Canada) or the following equipment codes and standards: CSD-1, UL 795, NFPA 37, ANSI Z83.4/CSA 3.7, ANSI Z83.18, ANSI Z21.13/CSA 4.9, or CSA B149.3 (for Canada).

Explanation of symbols

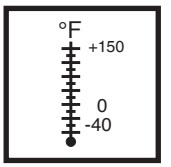
1, 2, 3 ... = Action
• = Instruction

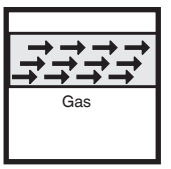
Specification

MBC- Two normally closed safety shutoff valves with integrated servo regulator in one housing. Fast opening, fast closing.



Safety Valve & Regulator Max. Operating Pressure
MOP = 5 PSI (138 in. W.C.)
Recommended Inlet Pressure for optimal performance of the regulator*
S22/S82: p_{in} = 6 - 138 in. W.C.
S302: p_{in} = 14 - 138 in. W.C.
S02 & N: p_{in} = 4 - 41 in. W.C.
*Regulator complies with ANSI Z21.18/CSA 6.3 for up to 5 PSI. Inlet pressures higher than recommended inlet pressures are possible provided the appliance complies with the applicable performance requirements.
Regulator Outlet Pressure Ranges
S22: p_{out} = 1.6 - 8 in. W.C.
S82: p_{out} = 2 - 32 in. W.C.
S302: p_{out} = 12- 122 in. W.C.
S02 & N: p_{out} = 0 ± 0.4 in. W.C.

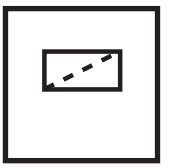




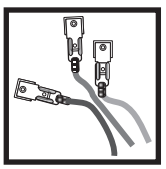
Ambient Temperature (CSA)
-40 °F ... +140 °F
(-40 °C … +60 °C)
Ambient Temperature (UL)
+5 °F ... +140 °F
(-15 °C … +60 °C)

Gases
Dry, natural gas, propane, butane; other noncorrosive gases. A "dry" gas has a dew point lower than +15 °F and its relative humidity is less than 60 %.
Materials in contact with Gas
Housing: Aluminium, Steel, free of nonferrous metals. Sealings on valve seats: NBR-based rubber.

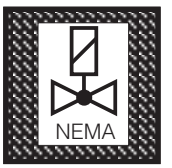
Electrical Ratings
110 - 120 VAC / 50 - 60 Hz;
24 VAC / 50 - 60 Hz; 12 VDC, 24 VDC
Operating time
100 % duty cycle
Cycle Rate
Maximum 60 cycles/hr (30 s on/off)



Filter
installed in the housing upstream V1
50 micron

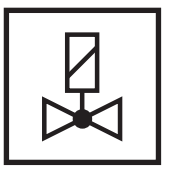


Electrical Connection
DIN-connector with 1/2" NPT conduit connection for UL Versions.
Order separately for CSA Versions
Power Consumption with all coils energized
see table below



Enclosure Rating
NEMA Type 12 / IP54

Vent Limiting Device and Vent Line Connection
The MBC has an internal, factory installed vent limiter re ANSI Z21.18/ CSA 6.3. Venting required unless otherwise accepted by the authority having jurisdiction.



Classification of Valve V1 and V2
Safety Shutoff Valve: UL 429, FM 7400
ANSI Z21.21 • CSA 6.5 C/I Valves
Closing Time (Valve 1 & Valve 2)
< 1 s
Opening Time (Valve 1 & Valve 2)
< 1 s

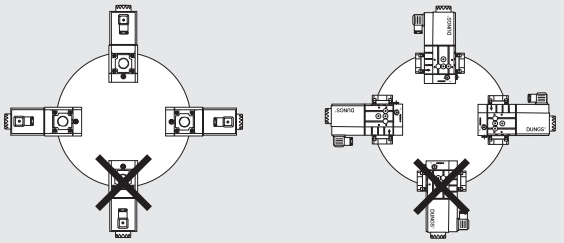
Power Consumption Table

Valve Body Size	Rated voltage	Inrush $P_{max.}$ [VA] for t = 3 s	Inrush current peak (A)	Holding $P_{max.}$ [VA] Operation	Recommended power of supply transformer (VA)
MBC 1000	12 VDC	140	20.1	16	DC battery
MBC 2500		160	20.1	20	DC battery
MBC 4000		–	–	–	–
MBC 1000	24 VDC	130	13.4	16	DC battery
MBC 2500		160	13.4	20	DC battery
MBC 4000		160	14	30	DC battery
MBC 1000	24 VAC*	120	14.7	20	250
MBC 2500		160	13.9	20	300
MBC 4000		–	–	–	–
MBC 1000	110/120 VAC*	120	3.1	16	250
MBC 2500		180	3.0	20	300
MBC 4000		160	2.4	25	300

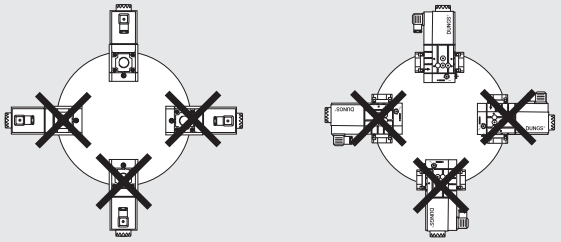
*Power supply should compensate for the inrush current, and wire gauge should be considered. In order to absorb voltage spikes during inrush, an electrolytic capacitor (4700 µF) between MBC and transformer is recommended.

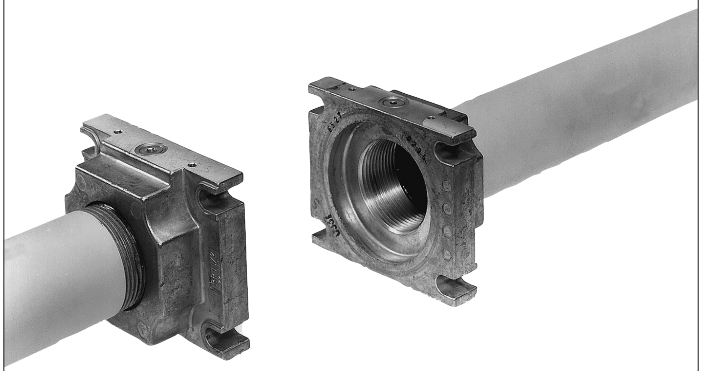
Mounting

Installation position
SE Versions ending in S22/S82/S302



Installation position
SE Versions ending in S02





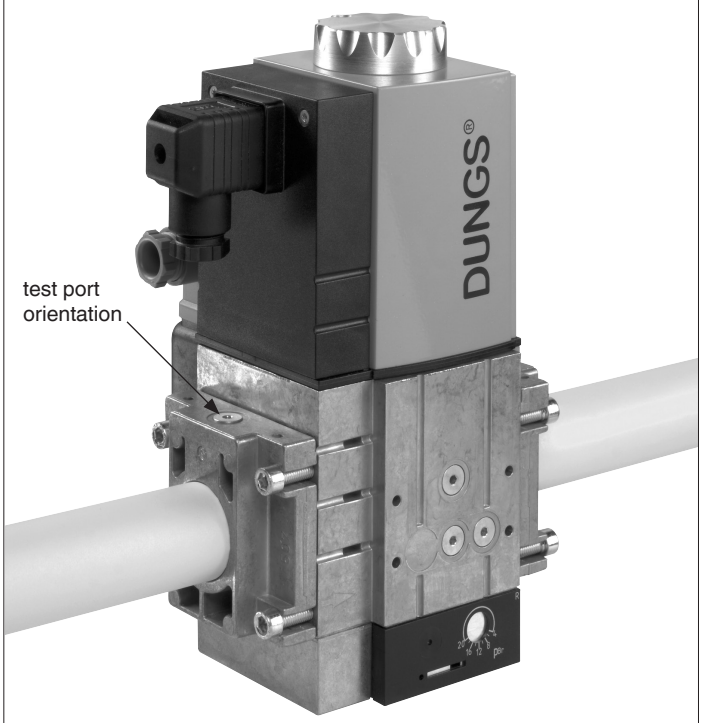
If the flow is not in the same direction of the arrows, the valves will not operate properly.

Setup

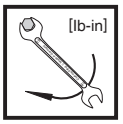
1. Examine the MBC valve for shipping damage.
2. The main gas supply must be shutoff before starting the installation.
3. The inside of the MBC valve, the flanges, and piping must be clean and free of dirt. Remove all dirt and debris before installing the MBC valve. Failure to remove dirt / debris could result in valve damage or improper performance.

Recommended Procedure to Mount the Flanges

1. Unpack the MBC valve and remove the socket cap head bolts from white plastic cover.
   For MBC 1000: use 5 mm hex wrench for M6 bolts
   For MBC 2500/4000: use 6 mm hex wrench for M8 bolts
2. Verify the o-rings and the grooves are clean and in good condition.
3. Clean the mounting surface of the flanges.
4. Mount the flanges to the MBC valve with the pressure tap in the orientation shown in the picture.
5. Tighten the bolts in a crisscross pattern. See table for recommended torque!



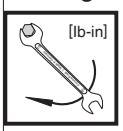
Do not overtighten the bolts.
Follow the maximum torque values next page.



Recommended Torque System Accessories	M3	M6	M8	Screw Size
	11 lb-in	62 lb-in	134 lb-in	[lb-in]

Recommended Piping Procedure

- Use new, properly reamed and threaded pipe free of chips.
- Apply good quality pipe sealant, putting a moderate amount on the male threads only. If pipe sealant lodges on the valve seat, it will prevent proper operation. If using LP gas, use pipe sealant rated for use with LP gas.
- Do not thread pipe too far. Valve distortion and/or malfunction may result from excess pipe in the valve body.
- Apply counter pressure only a parallel jaw wrench only to the flats on the flange when connecting to pipe.
- Do not overtighten the pipe. Follow the maximum torque values listed below.



Recommended Torque for Piping	1/2”	3/4”	1”	1 1/4”	1 1/2”	2”	NPT pipe
	375	560	750	875	940	1190	[lb-in]

• On completion of work on the MBC valve, perform a leakage test. (See “Valve Leakage Test”)

Painting Valve

- It is not recommended that this valve be painted. Painting covers date codes and other labels that identify this valve.
- If the valve needs to be painted, a paint free of volitile organic componants (VOC’s) must be used. VOC’s can damage valve o-rings, resulting in external gas leakage over time.
- During the painting process, use measures that will allow the valve’s date code and other labeling information to be legible after the paint is dry.
- Painting the valve may damage valve o-rings, resulting in external gas leakage over time.

Protection from Radiant Heat

- Radiant heat must be considered as a heat source that could result in an ambient temperature higher than the rating of this valve.
- Provide proper shielding to protect against radiant heat.

Alterations, Modifications or Repairs

For safety-related components, devices and systems, any liability of DUNGS, i.e. product liability for any kind of consequential damage as well as liability for defects, will cease to exist if alterations, modifications or repairs are made to these safety-related components, devices and systems by unauthorized specialist staff or with spare parts which have not been specially permitted for use in these safety-related components, devices and systems.

Electrical DIN Connector Ratings

Ambient Temperature Rating: -40°F to +175°F
Electrical Ratings: 120VAC, 24VAC 50/60 Hz, 12 VDC or 24VDC.
Maximum Amperage Rating: 6.0 Amps @ 120VAC.
Enclosure Rating: Type 12
Electrical Wiring Connection: Screw terminals.
Required Wire Specifications:
Type: Stranded, insulated Appliance Wiring Material (AWM) "Hook-Up" wire.
Approvals: UL Recognized Single Conductor, Thermoplastic Insulated Wire, Type AWM. Temperature Rating: At least 75°C (170°F). Voltage Rating: 300 Volts maximum / Single phase. Wire Size: AWG #18 minimum ONLY. No more the AWG #14.

Ratings for conduit and conduit fittings:

Temperature:	At least 75°C (170°F)
Voltage:	300 Volts minimum
Approvals:	UL Listed conduit and conduit fittings
Size:	1/2" Conduit and 1/2" Conduit Fitting.

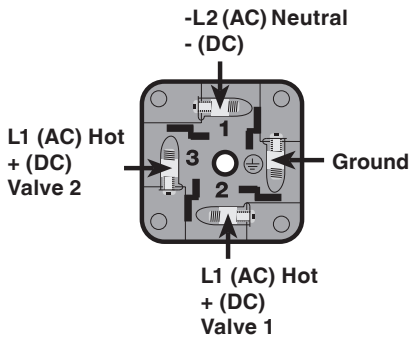
Select one conduit type and its suitable conduit fitting from the following table.

1/2" Conduit Type and Suitable 1/2" Conduit Fitting		
Liquid-tight, Flexible Non-Metallic Conduit (LFNC-B) Type B	ONLY with →	Liquid-tight, non-metallic fitting, Type NM (non-metallic) conduit fitting
Liquid-tight, Flexible Metallic Conduit	ONLY with →	Liquid-tight, metallic fitting, Type FLEX/MC (Flexible/Metal Clad)
Standard thickness, steel or aluminum, Flexible Metal Clad Conduit	ONLY with →	Metallic fitting, Type "squeeze", "set screw", or "screw-in"

Initial Setup:

1. Verify that all power to all wires at the terminals in the nearest conduit body (panel) are disconnected before proceeding.
2. At least 4 wires (1 Safety Ground, 2 Hot and 1 Neutral) are needed for wiring. NOTE: One neutral wire can be used to power both valves.

DIN Connector screw terminal connections



IMPORTANT: DO NOT make any terminal connections at the nearest conduit body until all terminals in the valve connector are properly wired and the valve connector is properly assembled to the 1/2" flexible conduit.

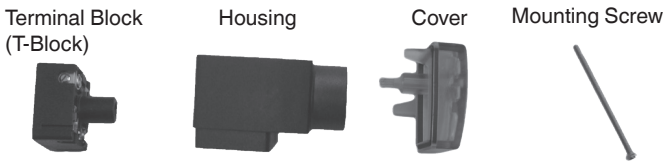
NOTE: Flexible conduit more than 3ft. long must be properly supported and secured, as specified in NFPA 70, Article 350 and 351.

Electrical DIN Connector assembly & wiring

Failure to follow the exact instructions below may result in a valve connector not fitting to valve.

STEPS

1. After selecting the proper number of wires, push the mounting screw completely out from the valve connector and disassemble the remaining 4 parts as shown below:



2. Starting from the 1/2" NPT end of the housing, push the wires under the metal strain relief and through the housing (see FIG. A below). The GREEN (ground) wire should be placed into the far left groove when viewed as shown in FIG. B. The "Neutral (-) " should be placed into the groove next to the GREEN (ground).

Fig. A

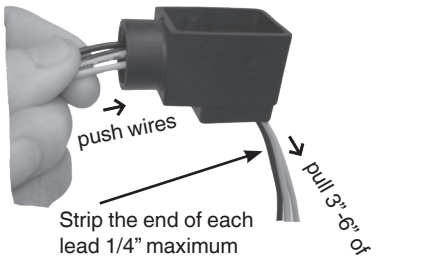
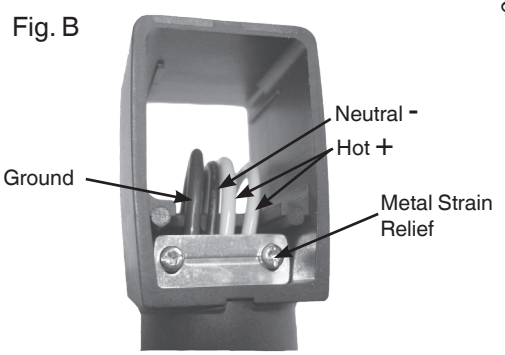
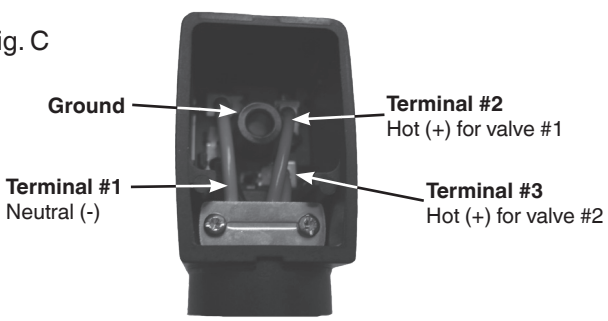


Fig. B



3. Continue to push the wires through the housing until there is at least an extra 3"- 6"available for connecting the wires to the terminals on the T-Block (see FIG. A above).
4. Strip no more than 1/4" of insulation from each wire.
5. Wiring to the correct terminal is critical. The terminals are labeled next to the terminal screws. Terminate each wire to its proper terminal on the T-block. See FIG. C to determine the proper terminals for the valve. NOTE: One neutral is used to power both valves.

Fig. C



The maximum torque for the terminal screws is 4.4 in-lb (0.5 Nm).

6. Pull the wires so that the T-Block is completely pulled into the housing. As the T-Block gets pulled into the housing, the T-Block and the wires must be properly guided into the housing by:

A) Ensuring that the ground (the flat pin of the plug) fits to the front of the housing as shown in FIG. D below,

AND

B) Ensuring that the wires lay side-by-side beneath the metal strain relief as shown in Fig. E below,

AND

C) Organizing the wires so that they terminate on the same side of the connector under which they were routed. The wires must NOT crisscross inside the housing to the opposite side from which they are terminated. Fig. C illustrates how the wires terminate on the same side under which they were routed.

Fig. D

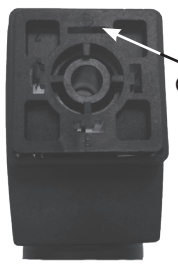
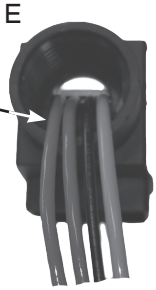


Fig. E



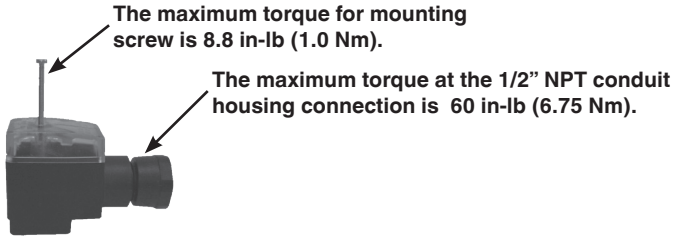
7. Tighten the screws on the metal strain relief.

The maximum torque for each metal strain relief screw is 4.4 in-lb (0.5 Nm).

8. Assemble the appropriate 1/2" flexible conduit and its suitable conduit fitting as specified in the table on page 3.
9. Route the "pig-tailed" wires from the valve connector through the 1/2" conduit and to the nearest conduit body (panel), and then screw the valve connector to the 1/2" conduit fitting (see below for proper torque).

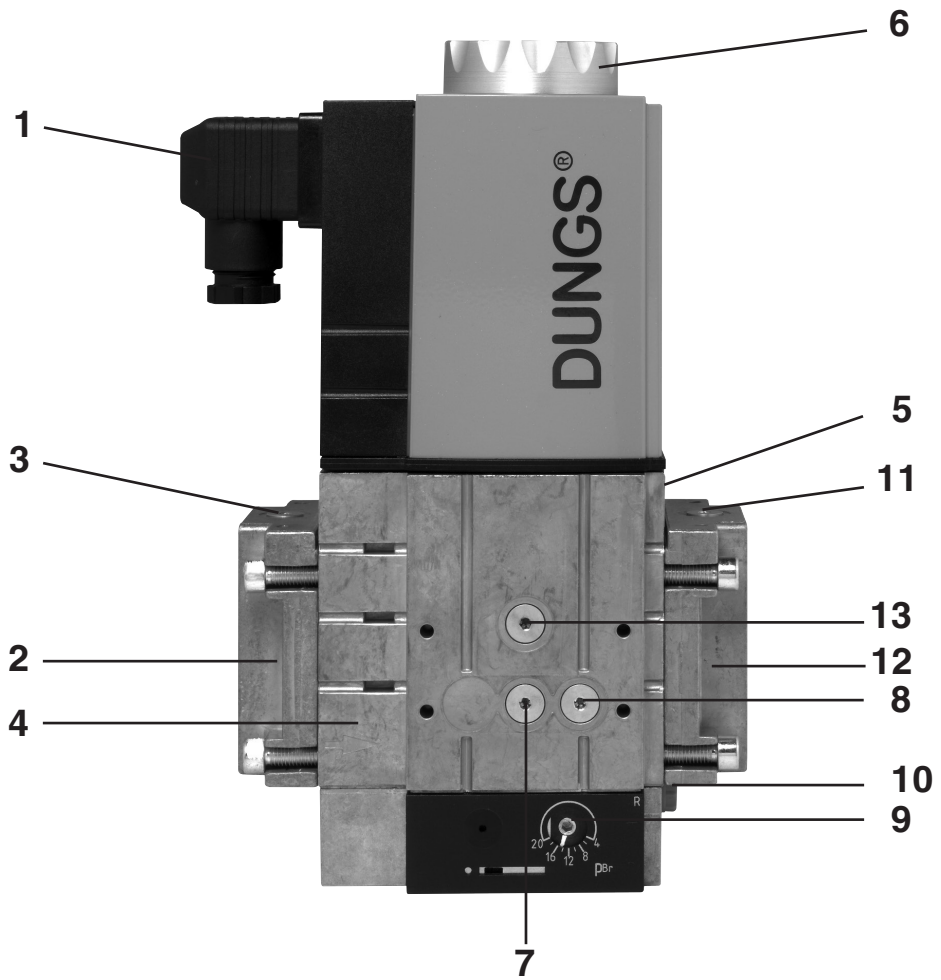
NOTE: It may be necessary to pull the wires at the nearest conduit body to reduce any potential wire slack in the raceway as the valve connector is screwed to the 1/2" conduit fitting.

10. Assemble the cover and mounting screw to the valve connector, and mount the valve connector to the valve coil as shown below.



11. Tighten the mounting screw.
12. Follow NEC (NFPA 70) requirements for proper termination at the nearest conduit body.

MBC Overview & Impulse Lines



Impulse lines must be ordered separately

1	Electrical connection for valves (DIN EN 175 301-803) black
2	Input flange
3	Pressure connection G 1/8 upstream of filter
4	Filter
5	Label / Serial number
6	Cover
7	Test point connection G 1/8 upstream of V1, possible on both sides
8	Test point connection G 1/8 downstream of V2, optional
9	Regulator Outlet Pressure Adjustment
10	Vent connection / Vent limiter G 1/8 (breathing port)
11	G 1/8 pressure connection Burner pressure p_{Br} (optional in some models)
12	Output flange
13	Test point connection G 1/8 downstream of V1 and upstream V2, possible on both sides.

External Impulse line (option)
Assembly Instructions

⚠ Impulse line p_{BR} must correspond to ≥ DN 4 (1/8"), PN 1 and they must be made of steel.

Other materials for Impulse lines are only permitted after a certification with the burner / boiler.

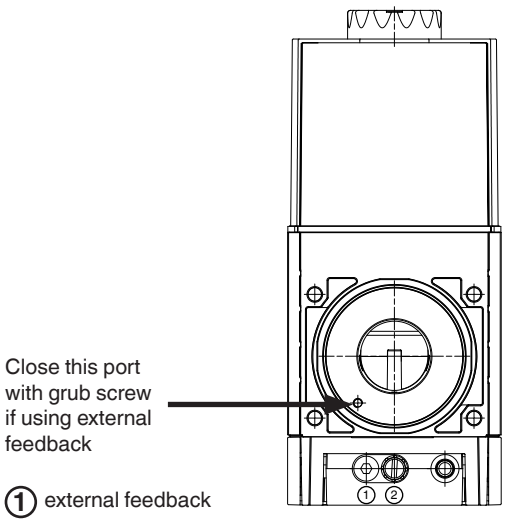
⚠ **Close internal Impulse line with grub screw. See Fig. 1**

⚠ Route Impulse line so that no **condensate** can flow back to the MBC...SE. See Fig. 2

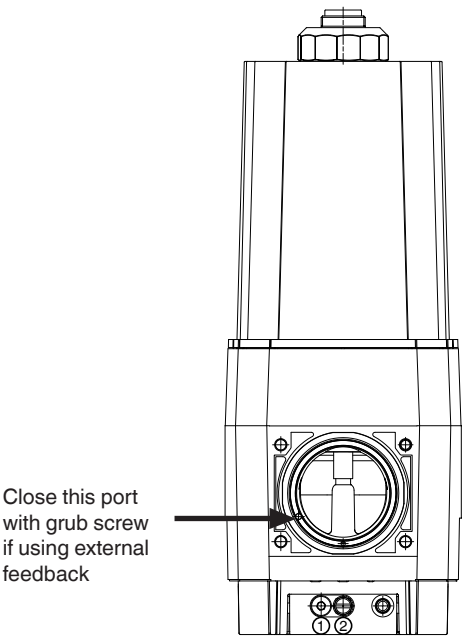
⚠ Secure Impulse line to prevent them from being ripped out and deformed.
Keep Impulse line short!

⚠ Test Impulse line for external leakage. Use leakage spray only if necessary.
Test pressure:
$p_{max.}$ = 40" W.C.

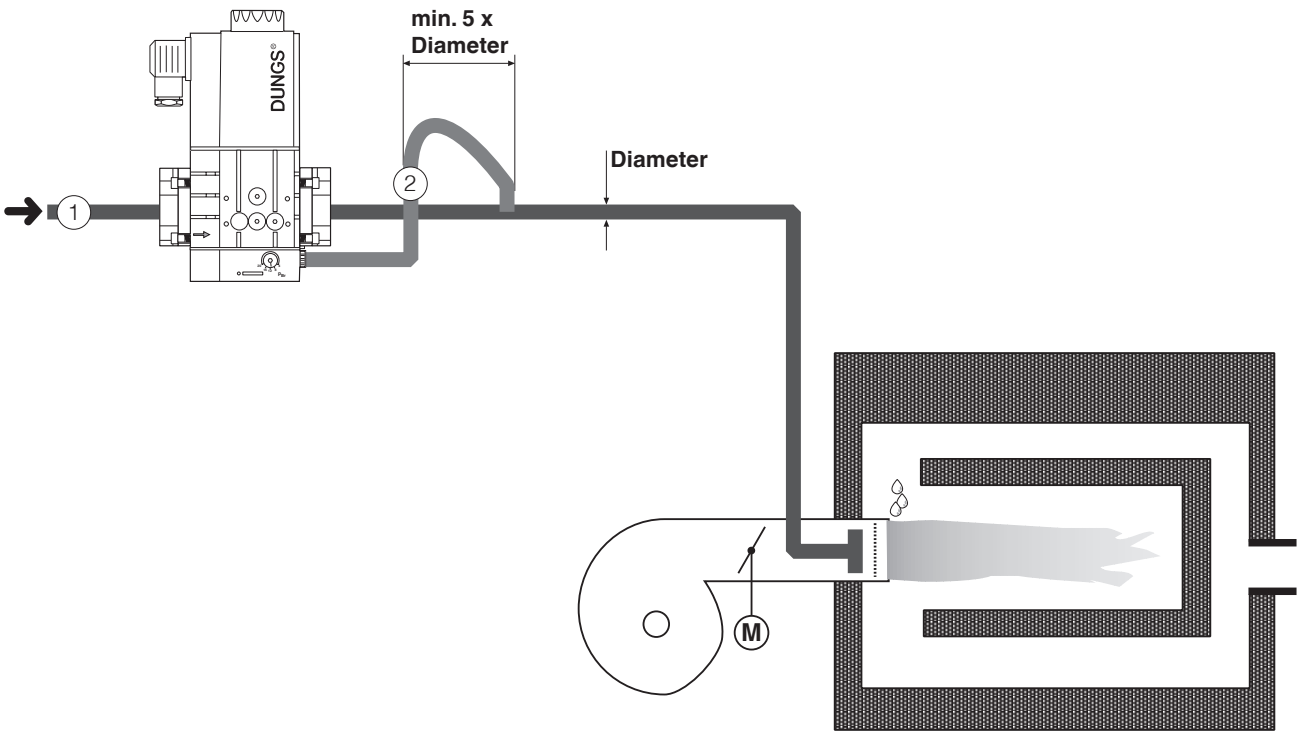
MBC 1000/2500
Fig. 1



MBC 4000



MBC...SE
Recommended Installation of Impulse lines when used (optional)



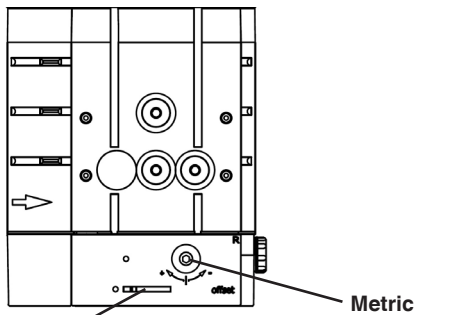
Outlet Pressure Adjustment

MBC...SE S22/82/302

- Open protective slide located at the bottom of the valve.
- See Fig. 1 & 2 for adjustments.

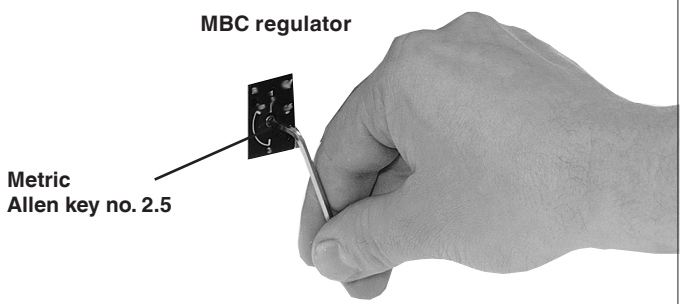
1. Make adjustments while the valve is energized and flame established.
2. Using a 2.5 mm Metric Allen key, adjust the outlet pressure to the gas regulator for the application.
   Turning the adjustment towards lower numbers decreases the outlet pressure.
   Turning the adjustment towards higher numbers increases the outlet pressure.
3. Verify that the outlet pressure and the products of combustion are within the operating range as specified by the original equipment manufacturer.

1



After setting the required pressure setpoint:
1. Close protective slide.
2. Secure protective slide closed position with a screw

2



⚠ Read all instructions in this manual before installing. Perform steps in the order given. Have installed and serviced/ inspected by a qualified service technician, at least annually. Failure to comply could result in severe personal injury, death or substantial property damage.

⚠ A calibrated flue gas analyzer must be utilized to properly adjust appliances featuring DUNGS MBC controls. Failure to properly apply a flue gas analyzer can result in carbon monoxide emissions causing severe personal injury, death or substantial property damage.

⚠ Failure to follow all instructions can result in carbon monoxide emissions causing severe personal injury or death.

MBC...SE S02 & MBC N

1. Open protective slide located at the bottom of the valve.
2. See Fig. 1 & 2 for low fire adjustments.
3. See Fig. 3 for high fire adjustments

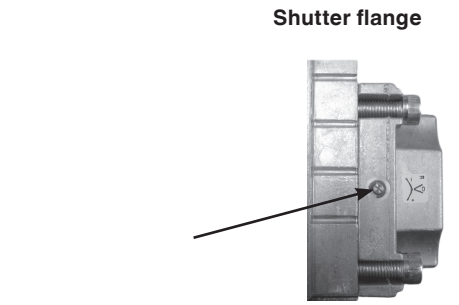
NOTE: There will be a slight delay between the adjustments and the response of the flue gas measuring equipment.

NOTE: Making high fire adjustments can affect the low fire setting, and vice versa. Therefore, modulate the equipment up and down at least three times to double check the low fire and high fire emissions after making adjustments.

High Fire setting using Shutter flange

1. With valve energized and flame established, drive the appliance to high fire.
2. Use a slotted screwdriver to adjust the gas/air ratio concentration for the application.
   Turn the adjustment towards the – symbol to decrease gas flow.
   Turn the adjustment towards the + symbol to increase gas flow.
3. Verify that products of combustion are within the operating range as specified by the original equipment manufacturer.

3



Low Fire setting using MBC regulator

1. With valve energized and flame established, adjust the fan speed to the minimum firing rate for the appliance.
   - It is important to only adjust the low fire gas / air ratio concentration for the application while the appliance is operating at its minimum firing rate.
   - The minimum negative signal to zero governor must be at least -0.2"WC. This can be measured at the test port downstream both safety shutoff valves with the blower on and running at the minimum firing rate RPM.
   - **NOTE:** Both safety shutoff valves must be closed to read this signal pressure. This will be a negative pressure/vacuum signal.
2. Using a 2.5mm Metric Allen key, adjust the offset pressure to the gas / air ratio concentration for the application.
   Turn the adjustment towards the – symbol to decrease the outlet pressure.
   Turn the adjustment towards the + symbol to increase the outlet pressure.
3. Verify that products of combustion are within the operating range as specified by the original equipment manufacturer.

Changing coil

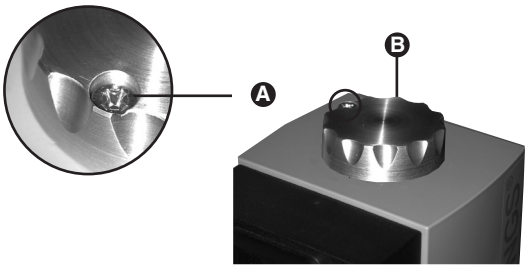
MBC-1000/2500

1. **Shut off gas supply and disconnect power supply!**
2. Undo locking screw A, Fig. 1
3. Remove cover B, Fig. 2
4. Exchange solenoid, Fig. 3

Always observe solenoid No. and voltage!

5. Replace cover B, tighten by hand, Fig. 4
6. Screw in locking screw A to stop, Fig. 5

1



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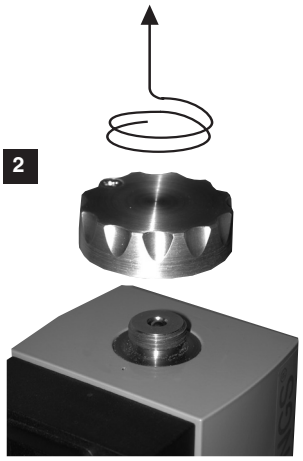

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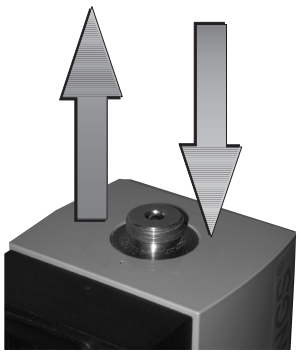

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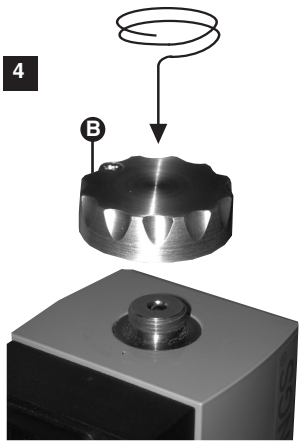

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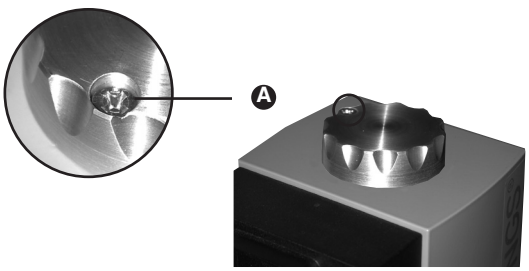


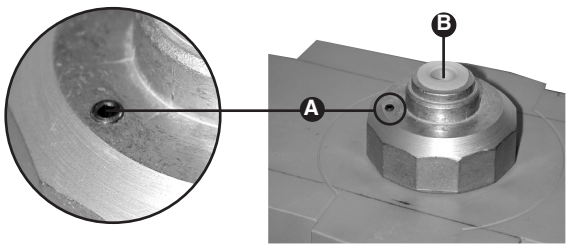
MBC-4000

1. **Shut off gas supply and disconnect power supply!**
2. Undo locking screw A, Fig. 1.
3. Remove cover B, Fig. 2.
4. Carefully lift off solenoid cover, Fig. 3.
5. Disconnect grounding and PCB connectors, Fig. 4.
6. Replace solenoid, Fig. 5

Note:
Coil V1 wire connection black/white
Coil V2 wire connection red/blue
Replacement solenoid is complete assembled.

7. Make electrical connections. Assemble in reverse order.
8. Reattach cover B, tighten securely by hand only, Fig. 6.
9. Tighten lock screw A as far as the stop, Fig. 7.

1



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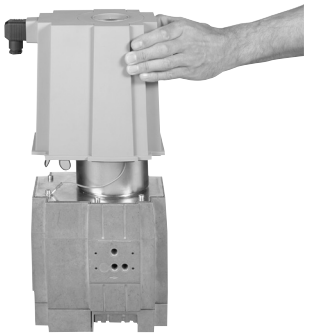

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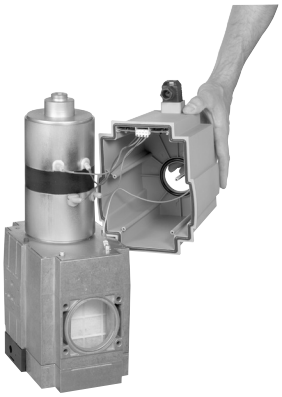

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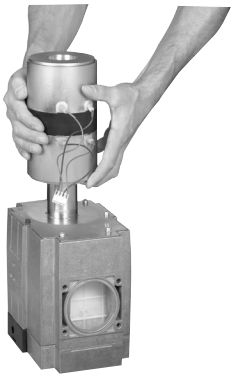

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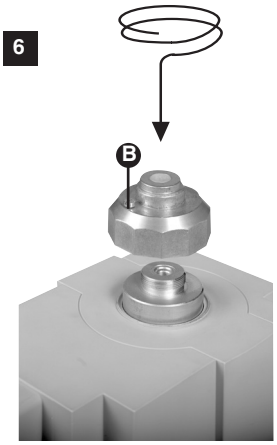

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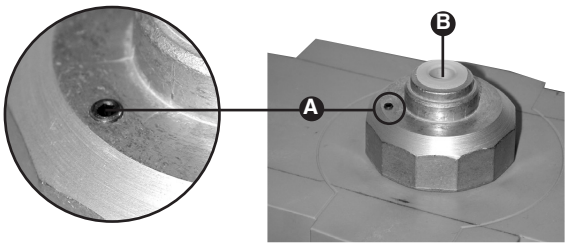


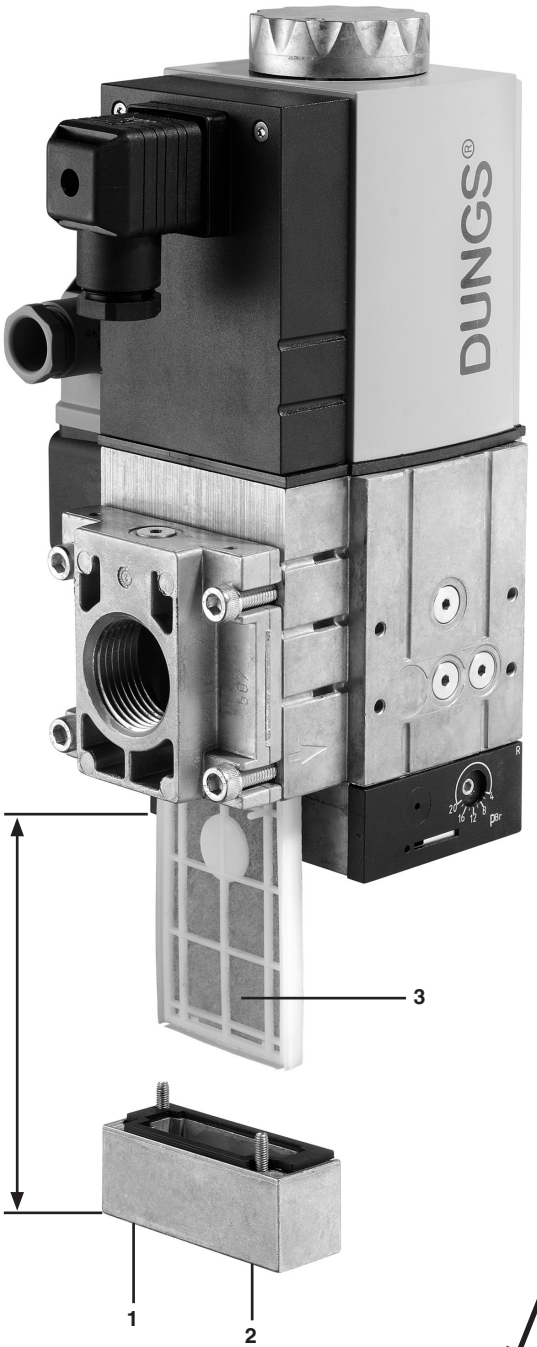
Internal Filter

Inspect the filter at least once a year.
Change the filter, if Δp between pressure taps 1 and 4 > 4" W.C. See page 13 "Pressure taps".

Change the filter, if Δp between pressure taps 1 and 4 is twice as high compared to the last inspection.

1. Interrupt gas supply: close upstream ball valve
2. Remove screws 1-2
3. Change filter insert 3
4. Screw in screws 1-2 without using any force and fasten 22 in. lbs (2.5 Nm).
5. Perform leakage and function test, p_{max} = 5 PSI

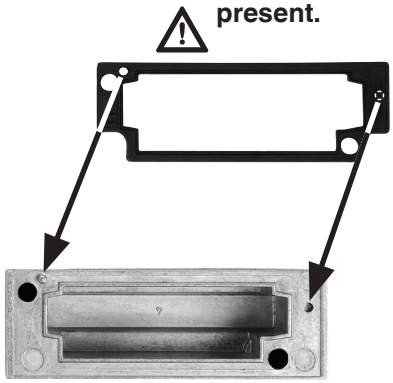
1



Space requirements for fitting filter:

MBC-1000-...: 6"
MBC-2500-...: 7"
MBC-4000-...: 9"

For production date codes May 2007 or newer, this feature is present.

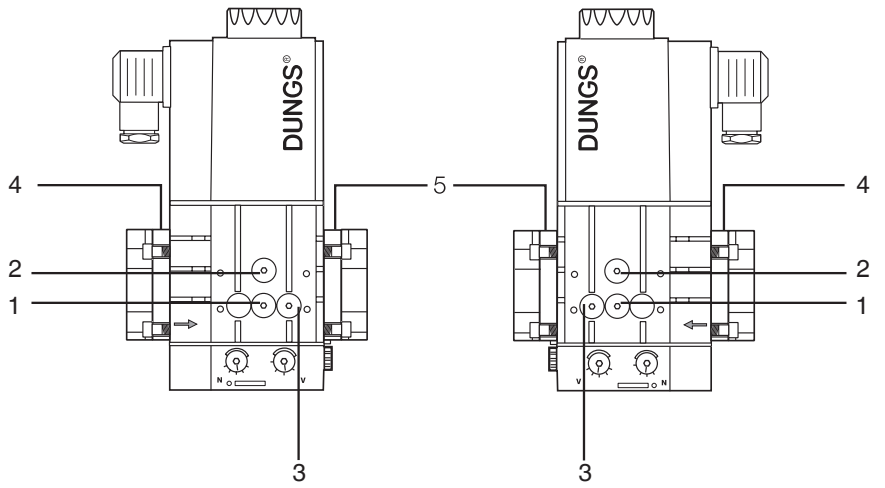


Test Ports

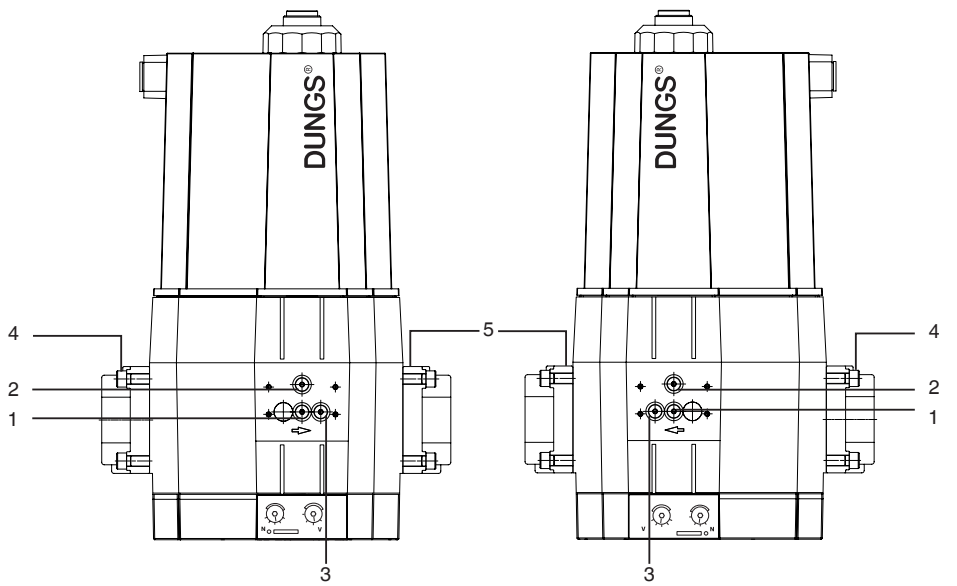
The G ⅛ ISO 228 taps are available on both sides upstream V1, between V1 and V2, downstream V2, and on both flanges. The G ⅛ test nipple (P/N 219008) can be screwed in any of these pressure tap ports.

Pressure taps

MBC-1000/2500…



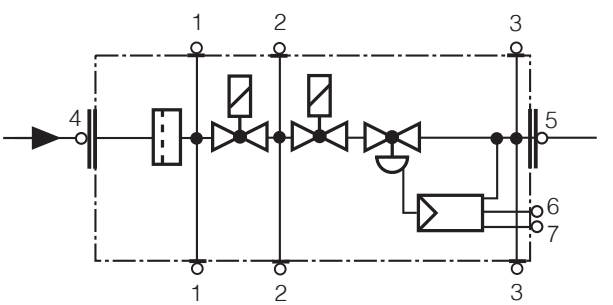
MBC-4000…



1, 2, 4, 5
G 1/8 Screw plug
Pressure Switch Connection

3
G 1/8 Screw plug
Pressure Switch Connection
optional with P/N 214975

6, 7
Vent nozzle G 1/8



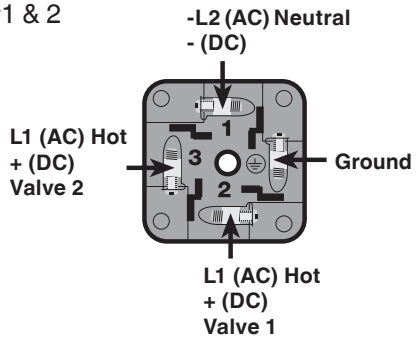
Valve Leakage Decay Test

This test method is an alternative to bubble tightness testing in case there is no manually operated shutoff valve installed downstream of the MBC.

Preparation for leak testing:

1) Ensure that the appliance is not in operation.
2) This test requires:
   - A manometer capable of reading +/- 0.1”WC.
   - A stopwatch.
   - A hose barb connection that fits to manometer and the valve test port.
3) The manual shutoff valve upstream of the MBC must remain open during this test. In addition, the manual shutoff valve downstream of the MBC, if installed, must remain open during this test.
4) The test also requires the ability to open and close safety valve #1 and safety valve #2 independently using the voltage as indicated on the coil.
5) Externally leak test the valve and all piping connected to the valve including the upstream manual shutoff valve and the manometer connection. DUNGS recommends using an all purpose liquid leak detector solution (Snoop™ or a non-aggressive soapy water solution). The presence of bubbles indicates a leak.
6) The DIN connector of the MBC Valve has three connections that provide power to the coil along with a ground connection. Pin numbers indicated on DIN connector.

Pin # 2 = Line voltage Valve #1
Pin # 3 = Line voltage Valve #2
Pin # 1 = Neutral Valve #1 & 2
⏚ = Ground



Procedure for Testing Valve #1

1) Connect a manometer to Port 2 on the side of the MBC
2) Determine the test time according the valve size, as indicated on table 1.
3) Energize valve 2 by powering terminal 3 with the voltage indicated on the coil housing. Ensure that terminal #1 is connected to Neutral and that the safety ground is also connected to ground.
4) Mark the pressure reading on the manometer, which should be zero.
5) With a stopwatch ready, de-energize valve 2 and immediately start the timer. Watch the manometer for pressure change.
6) As soon as the test time expires, determine the amount of pressure rise. Reference table 2 for action to be taken.

Procedure for Testing Valve #2

1) Connect a manometer to Port 2 on the side of the MBC
2) Determine the test time according the valve size, as indicated on table 1.
3) Energize valve 1 by powering terminal 2 with the voltage indicated on the coil housing. Ensure that terminal #1 is connected to Neutral and that the safety ground is also connected to ground.
4) Mark the pressure reading on the manometer, which should be equal to the inlet pressure to the valve.
5) With a stopwatch ready, de-energize valve 1 and immediately start the timer. Watch the manometer for pressure change.
6) As soon as the test time expires, determine the amount of pressure change. Reference table 2 for action to be taken.

After completing the above tests:

1) Remove the manometer, and close Port 2.
2) Use soapy water to leak test all connections including Port 2 to ensure that there are no leaks.

Leakage rates according to UL 429 and ANSI Z21.21			
	Test time (s)	**Allowable leakage (cc/hr)**	**Maximum pressure drop (in. W.C.)**
MBC 1000	4.0	235.0	2.0
MBC 2500	5.0	305.0	2.0
MBC 4000	6.0	470.0	2.0

Analysis of test results		
Pressure drop / rise (in. W.C.)	**Acceptable**	**Test results**
2.0 or less	Yes	Pass
More than 2.0	No	Fail - Immediately replace valve

Valve Leakage Bubble Test (Altern. method)

This leak test procedure tests the external sealing and valve seat sealing capabilities of the MBC automatic safety shutoff valve. Only qualified personnel should perform this test.

It is required that this test be done on the initial system startup, and then repeated at least annually. Possibly more often depending on the application, environmental parameters, and the requirements of the authority having jurisdiction.

Setup

This test requires the following:

A) Test nipples installed in the downstream pressure tap port of each automatic safety shutoff valve to make the required 1/4" hose connection in step 4.

B) A transparent glass of water filled at least 1 inch from the bottom.

C) A proper leak test tube. An aluminum or copper 1/4" rigid tube with a 45˚ cut at the end that is then connected to a 1/4" flexible hose of some convenient length provides for a more accurate leakage measurement.
However, a 45˚ cut at the end of the 1/4" flexible hose will suffice, but it will not likely be as accurate as the rigid tube.

D) For detecting external leakages, an all purpose liquid leak detector solution or a soapy water solution is required.

Leak Test Procedure

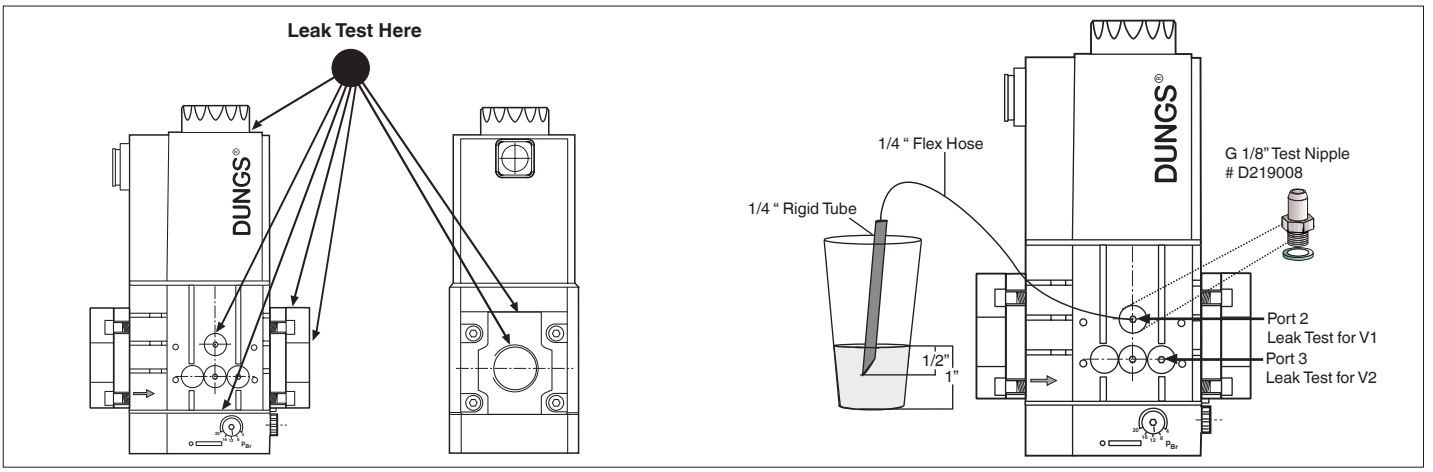
Use the illustration below as a reference.

1. With the upstream ball valve open, the downstream ball valve closed and both valves energized, apply an all purpose liquid leak detector solution to the "External Leakage Test Areas" indicated in the illustration below, to any accessories mounted to the safety valve, and to all gas piping and gas components downstream the equipment isolation valve, and the inlet and outlet gas piping of the automatic safety shutoff valve. The presence of bubbles indicates a leak, which needs to be rectified before proceeding.
2. Then, de-energize the burner system and verify that both automatic safety shutoff valves are closed.
3. Close the upstream and downstream manual ball valve.
4. Using a screwdriver, slowly open the V1 test nipple (port 2) by turning it counter clockwise to depressurize the volume between the two valves, and connect the 1/4" flexible hose to the test nipple.
5. Slowly open the upstream manual ball valve, and then provide for some time to allow potential leakage to charge the test chamber before measuring the valve seat leakage.
6. Immerse the 1/4 in. tube vertically 1/2 in. (12.7 mm) below the water surface. If bubbles emerge from the ¼" tube and after the leakage rate has stabilized, count the number of bubbles appearing during a 10 second period. (See chart below for allowable leakage rates.)
7. Repeat the same procedure for valve V2 (port 3). (Energize terminal 2 on the DIN connector to open valve 1)

After completing the above tests proceed as follows:

8. Verify that the downstream manual ball valve is closed, and both automatic safety shutoff valves are de-energized.
9. Remove the flexible hose, and close all test nipples.
10. With the upstream manual ball valve open, energize both automatic safety shutoff valves.
11. Use soapy water to leak test all test nipples to ensure that there are no leaks.
12. If no leakage is detected, de-energize all automatic safety shutoff valves, and open the downstream manual ball valve.

⚠ If leakage values are exceeded, replace valve immediately.

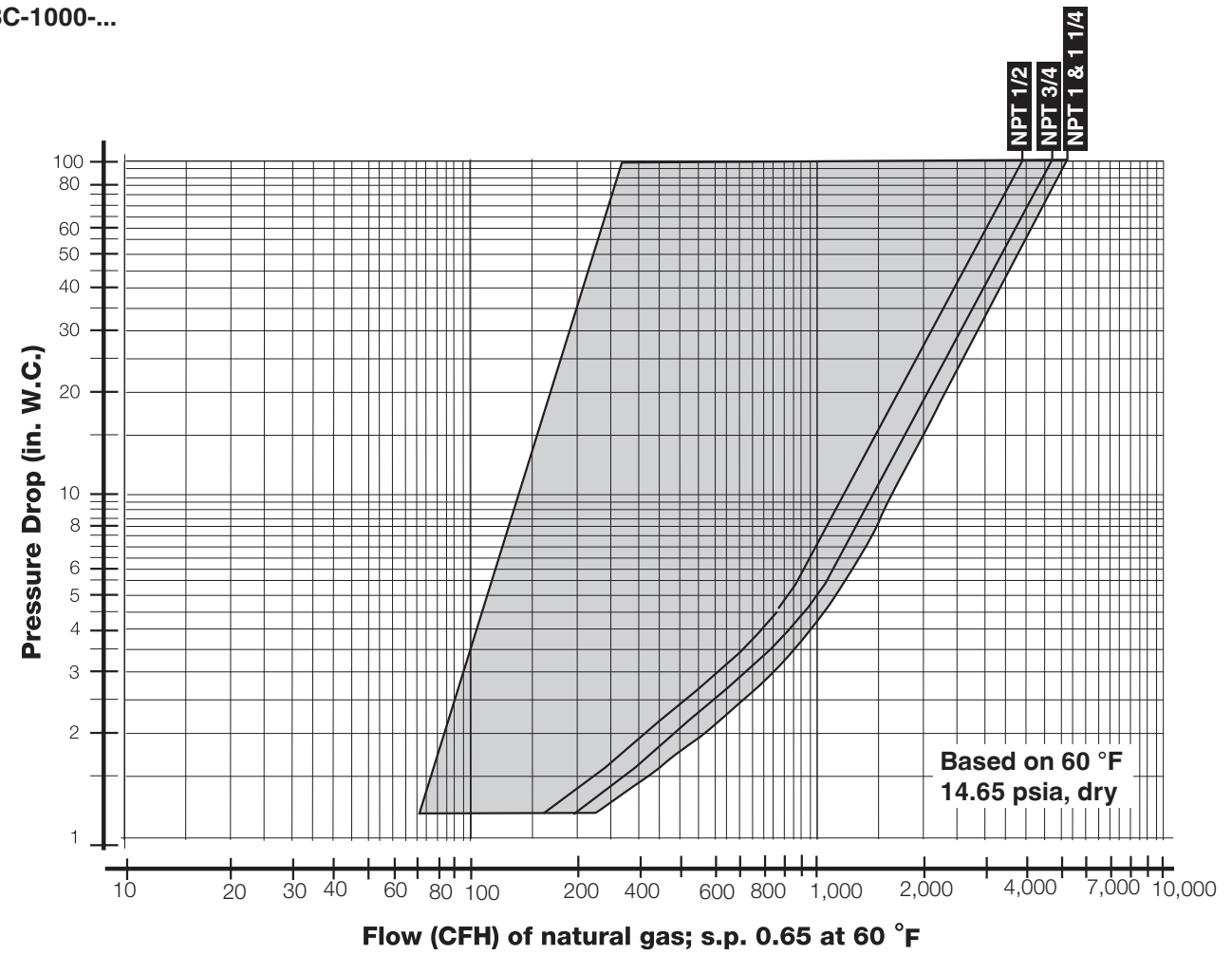


Type	Allowable Valve Seat Leakage* up to 7 PSI inlet	# of Bubbles in 10 s		
		Air	Natural Gas	LP
MBC 1000	235 cc/hr	5	6	4
MBC 2500	305 cc/hr	7	8	6
MBC 4000	470 cc/hr	10	11	9

*Based on air and test conditions per UL 429 Section 29. (Air or inert gas at a pressure of 1/4 psig and also at a pressure of one and one-half times maximum operating pressure differential, but not less than 1/2 psig. This test shall be applied with the valve installed in its intended position.) Volume of bubble defined in Table 2 of FCI 70-2-1998.

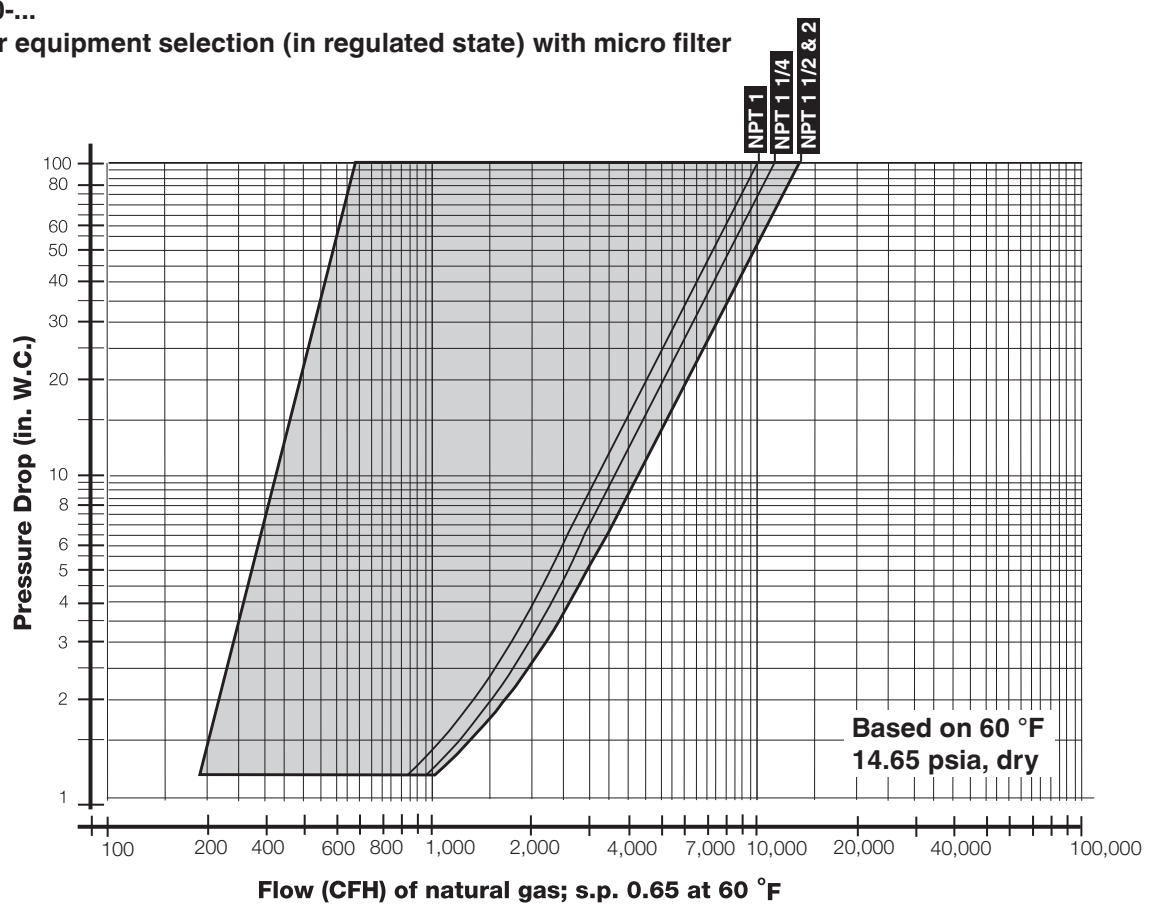
Flow Curve

MBC-1000-...

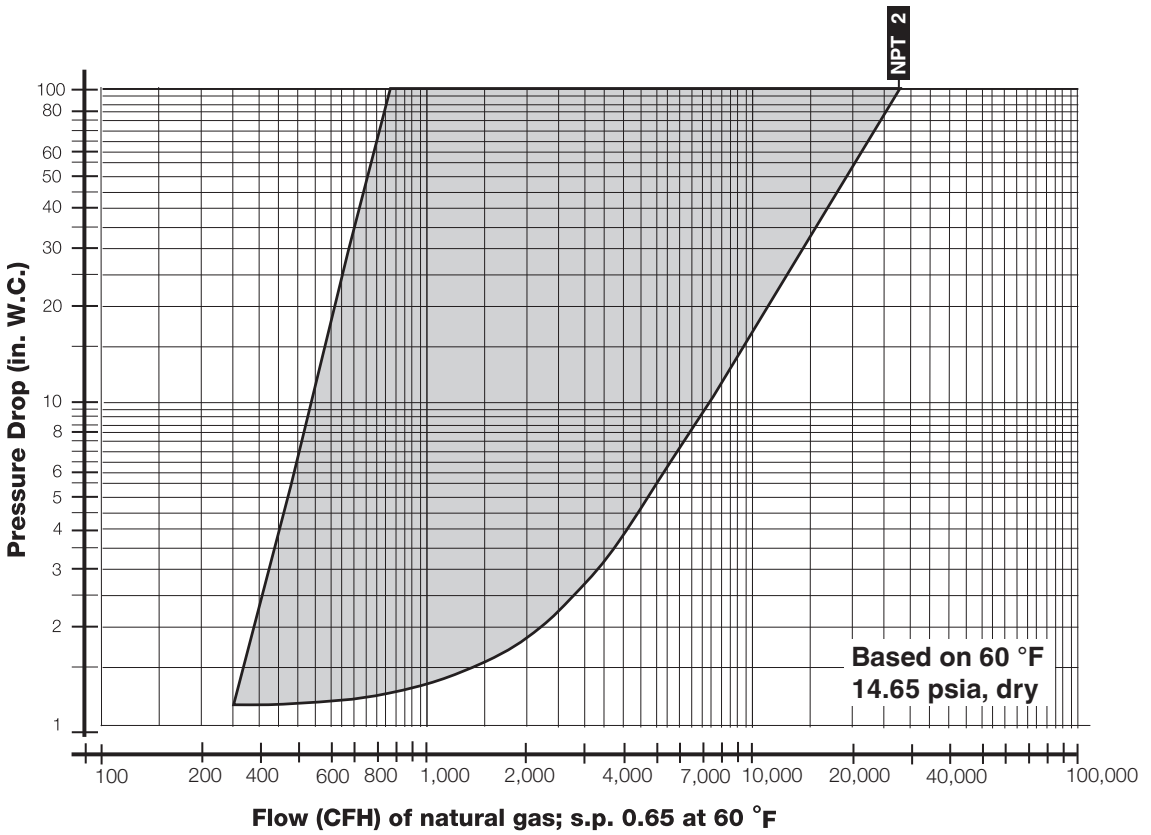


MBC-2500-...

Curves for equipment selection (in regulated state) with micro filter



MBC-4000-...
Curves for equipment selection (in regulated state) with micro filter



Pressure Drop for other Gases

To determine the pressure drop when using a gas other than natural gas, use the flow formula below and f value located in the table below to determine the "corrected" flow rate in CFH through the valve for the other gas used. For example, when using propane, divide the volume (CFH) of propane required for the application by the calculated value f (f = 0.66 for propane). Use this "corrected" flow rate and the flow curve on the next page to determine pressure drop for propane.

Determining equivalent flow through valves using another gas

$$\dot{V}_{\text{gas used}} = \dot{V}_{\text{Natural gas}} \times f$$

$$f = \sqrt{\frac{\text{Density of Natural gas}}{\text{Density of gas used}}}$$

Type of gas	Density [kg/m³]	s.g.	f
Natural gas	0.81	0.65	1.00
Butane	2.39	1.95	0.58
Propane	1.86	1.50	0.66
Air	1.24	1.00	0.80

Accessories & Replacement

1/4" NPT port 1 or port 2 adapter (reduced port)	225047	
1/2" NPT pilot/vent adapter (reduced port)	225043	
G 1/8" Test nipple with gasket	219008	
Gasket for G 1/8" Test nipple	171260	
Port 3 pressure switch mounting adapter	273777	
DUNGS DIN Connector	210319	Ordered separately on CSA / FM versions
Burkert DIN Connector for UL Listing	253731	Included as standard on UL and UR versions
Conduit Adapter (M20 to 1/2" NPT)	240671	For use with 210319
MBC 1000 replacement filter	241916	
MBC 2500 replacement filter	242072	
MBC 4000 replacement filter	245624	

Valve Description	Flange	NPT P/N	O-ring and bolt kit P/N
MBC 1000	1/2"	222371	224093
	3/4"	222368	224093
	1"	221999	224093
	1 1/4"	231718	224093
	1 1/2"	244021	224093
MBC 2500/4000	1"	222369	224094
	1 1/4"	222370	224094
	1 1/2"	222003	224094
	2"	221997	224094

*Includes two o-rings and two sets of bolts (one set of four bolts for each flange).

**Includes four bolts and one o-ring.

Shutter Flanges

Part description	MBC 1000	MBC 2500 / MBC 4000
1" NPT Flange set (with o-ring and 4 screws)	255132	256791
1.5" NPT Flange set (with o-ring and 4 screws)	NA	255133

Replacement Coils

Valve	110/120 VAC	24 VAC	12 VDC	24 VDC
MBC 1000	250371	250680	251136	252191
MBC 2500	250175	250681	251226	252192
MBC 4000	252613	not available	not available	252193

Printed wiring board is not replaceable

We reserve the right to make any changes in the interest of technical progress.

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